

Claims:

1. An electro-mechanical continuously variable transmission comprising:
 - a) a planetary gear set;
 - b) 5 an electrical branch having an electrical generator, an electrical motor, and an energy storage unit, with an input coupled to a first element of said planetary gear set, and an output coupled to a main output shaft of said transmission;
 - c) 10 a mechanical branch, with an input coupled to a second element of said planetary gear set and an output coupled to said main output shaft;
 - d) 15 a main power input coupled to a third element of said planetary gear set;
 - e) a generator output clutch coupled to an output of said generator and operative to selectively connect/disconnect said output of said generator to/from said main output shaft ; and
 - f) 20 a mechanical drive clutch coupled to said output of said mechanical branch and operative to selectively connect/disconnect said output of said mechanical branch to/from said main output shaft.

2. the transmission of claim 1, further including a planetary split speed clutch, operative to lock any two elements of said planetary gear set together, such that said generator output clutch, mechanical drive clutch and 5 planetary split speed clutch are operative when engaged to enable a boost mode which combines the power stored in said energy storage unit with power from said main power input to allow said transmission to operate at torque levels above those available using said main power input alone.

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2. The transmission of claim 1, where said energy storage unit consists of a bank of batteries.

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3. The transmission of claim 1, where said energy storage unit consists of a bank of capacitors and a bank of batteries.

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4. The transmission of claim 1, further including a generator output clutch coupled to said electric generator operative to allow power output from said generator to be used to charge said energy storage unit.

5. The transmission of claim 1, wherein said generator input clutch can also be engaged to allow said electric

generator to provide power to start an engine coupled to said main power input.

6. The transmission of claim 1, further including a
5 lockup brake coupled to said electrical branch, which is
operative to lock said electrical branch such that all
power to said main output shaft is driven by said
mechanical branch.

10 7. The transmission of claim 1, further including a range
splitter coupled to said output shaft to enable two or more
separate operating ranges for said transmission.

8. The transmission of claim 1, further including a
15 regenerative steering system operative to split power
between output ends when said main output shaft is used to
provide drive force at two ends of said main output shaft.

9. The transmission of claim 1, further including a
20 regenerative braking system to enable energy from braking
to be stored in said energy storage unit.

10. The transmission of claim 1, wherein said electrical
branch is arranged around a shaft parallel to said main
25 output shaft.

11. The transmission of claim 1, wherein said electrical branch is arranged coaxially around said main output shaft.

5 12. The transmission of claim 1, wherein said electrical branch is arranged coaxially around said main output shaft and said main power input is at one end of said main output shaft.

10 13. The transmission of claim 1, further including a reverse gear system coupled to said main power input which reverse the output direction of said transmission.

14. The transmission of claim 1, further including a
15 reverse gear system coupled to said main output shaft
operative to reverse the output direction of said
transmission.